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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/582,268

06/09/2006

Yasufumi Nishii

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EXAMINER

LIU, MICHAEL

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/582,268	Applicant(s) NISHII ET AL.	
	Examiner Michael Liu	Art Unit 2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 14-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 14-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/15/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Receipt is acknowledged of the Amendment filed 10/21/08. Claims 1-12, 14, and 17-20 have been amended, and claim 13 has been canceled by this amendment.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/21/08 has been entered.

Claim Rejections - 35 USC § 102

3. Upon closer review, Garcia has been applied to reject claims 14-16. The exposure method in the claim language can be reasonably interpreted as exposure to the proximity head.
4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 14-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Garcia et al (6,988,327).

Re claim 14: Garcia discloses an exposure method [Fig 5J; exposed to proximity head 106a-5] comprising:

holding a substrate 108 on a holder [C17L19-21: wafer holding device], there being a lyophilic portion 110 lower than an upper surface of the substrate 108 [Fig 5N-2: bottom portion of edge platform 110 lower than upper surface of wafer 108] held by the holder in a vicinity of the holder radially outward of an outer circumferential part of the substrate 108 held by the holder [Fig 5i], the lyophilic portion 110 facing downward [Fig 5N-2: bottom portion of edge platform 110 faces downward];

supplying liquid 106a-6 to the upper surface of the substrate 108; and

exposing the upper surface of the substrate held by the holder through the liquid [C10L54-55: top surface of wafer cleaned].

Re claim 15: recovering part of the liquid using the lyophilic portion 110c [C20L44-46 and Fig 5N-2].

Re claim 16: wherein a part of the holder is liquid repellent. [C18L10-13: Wafer 108, which is part of, or connected to, the wafer holding device, is liquid repellent, or hydrophobic.]

Claim Rejections - 35 USC § 103

6. The claim amendments have overcome Embodiment 6 of Lof. However, Embodiment 3 of Lof is now utilized as the primary reference with Hayashi for the obviousness rejection. Additionally, the previous anticipatory rejection using Garcia has been overcome. However, the Fukami reference teaching an immersion apparatus is now used in combination with Garcia for the obviousness rejection.

Art Unit: 2851

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-12 and 14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lof et al (2004/0160582) in view of Hayashi et al (2001/0035897).

Re claims 1, 14, and 15: Lof discloses an exposure apparatus [Fig 1] comprising:

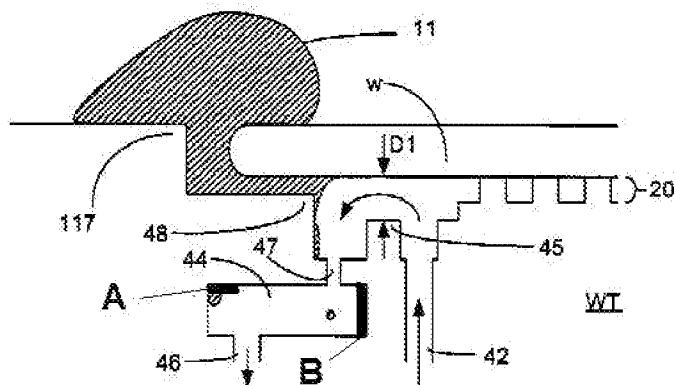
a projection optical system PL by which an image C of a pattern MA is projected onto an upper surface of a substrate W; and

a stage apparatus [Fig 7a], the stage apparatus including:

a holder WT having a substrate holding surface 20 on which the substrate is held, there being a gap along an outer circumferential part of the substrate held on the holder [Fig 7a: gap between W and 117];

a portion [Fig 7a: liquid flow portion between 117 and port 46] that is disposed in a vicinity of the holder radially outward of the outer circumferential part of the substrate held by the holder, the portion being disposed lower than the upper surface of the substrate held by the holder and facing downward [Drawing 1: portion A is radially outward and faces downward]; and

a recovery device 46 that recovers a liquid 11 leaked from the gap using the portion.



Drawing 1 Fig 7a of Lof showing labels A and B

Lof does not disclose expressly the portion being a lyophilic portion.

Hayashi teaches in Par 0145 an inner surface of a feed tube 302 being rendered hydrophilic.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to make the portion of Lof lyophilic, as taught by Hayashi, for the purpose of attracting the liquid towards the port 46 and to reduce the staying of bubbles within the portion, thus permitting the liquid to be conducted efficiently [Par 0145].

Re claim 2: Lof discloses wherein the recovery device 46 has a suction device [Par 0126: vacuum source] that suctions the liquid guided to the lyophilic portion.

Re claim 3: Lof discloses all limitations of the claimed invention except for disclosing expressly wherein suction force of the suction device by which the liquid is recovered is greater than suction force by which the substrate is held on the holder.

However, the embodiment of Lof is drawn to preventing liquid from reaching the pimple table 20 by funneling the liquid to vacuum port 46. Both the pimple table 20 and the port 46 have their own vacuum sources.

As a result, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to make the suction force of the vacuum port 46 to be greater than the suction force of the pimple table 20, in order to attract liquid to the port 46 rather than to the pimple table 20, for the safe removal of the liquid and to prevent liquid from seeping into the pimple table, which would cause damage.

Re claim 4: Lof discloses wherein the suction device 46 includes a passage disposed below the lyophilic portion [Fig 7a], and the lyophilic portion has an inclined portion B [inclined at 90°], which is inclined toward the passage of the suction device.

Re claim 5: Lof discloses wherein the lyophilic portion has a first portion 117 that is higher than the substrate holding surface 20.

Re claim 6: Lof discloses wherein the recovery device 46 has a recessed portion [Fig 7a] that suctions the liquid by the capillary phenomenon [recessed portion of 46 inherently suctions liquid by capillary action].

Re claim 7: Lof discloses wherein at least a part of the recessed portion [Fig 7a: liquid flow portion between 117 and port 46] is lyophilic.

Re claims 8, 9, 12, and 16: Lof discloses all limitations of the claimed invention except for wherein the recovery device has a surface that is substantially parallel to the substrate holding surface, and at least a part of which is liquid repellent.

However, Embodiment 6 of Lof teaches the recovery device has a surface 60 that is substantially parallel to the substrate holding surface 20 [Fig 11], and at least a part of which is liquid repellent [Par 0157: hydrophobic layer 60 is liquid repellent];

wherein at least a part 60 of the holder WT is liquid repellent;

wherein a portion of the holder that opposes the lyophilic portion A is liquid repellent.

At the time the invention was made, it would have been obvious to have the flat portion 48 in Embodiment 3 of Lof rendered hydrophobic, as taught in Embodiment 6, for the purpose of more easily attracting the liquid to the vacuum port 46 for removal from the system and so that the liquid does not find its way to the pimple table 20 [Par 0157], which would cause damage.

Re claim 10: Lof discloses all limitations of the claimed invention except for the substrate holding surface being liquid repellent.

However, Lof is directed to an immersion lithographic apparatus preventing liquid from reaching the pimple table 20. If liquid were to adhere to the pimple table surface, vacuum and wafer damage would result.

Therefore, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to make the substrate holding surface 20 of Lof liquid repellent, to remove liquid that reaches the substrate holding surface so the substrate holding surface functionality is maintained.

Re claim 11: Lof discloses wherein the lyophilic portion is disposed so that a space [Fig 7a and Par 0128: gap between W and 48] is formed between the outer circumferential part of the substrate and the lyophilic portion.

Re claim 17: Lof discloses wherein the lyophilic portion has an inclined surface B [Drawing 1] which is downwardly inclined [downwardly inclined at 90°] in a direction away from the substrate W held on the holder [Fig 7a].

Re claim 18: Lof discloses a flat surface 117 which is provided around the holder WT, and which is substantially flush with the surface of the substrate W held on the holder [Fig 7a],

wherein the recovery device 46 recovers, using the lyophilic portion [Fig 7a: liquid flow portion between 117 and port 46], the liquid 11 which has leaked from a gap between the flat surface 117 and the surface of the substrate W held on the holder [Fig 7a].

Re claim 19: Lof discloses a liquid supply system [Fig 2] which has a supply port 13, the liquid supply system supplying a liquid 11 onto the substrate W to form a liquid immersion area [at 11] on a portion of a surface of the substrate during the exposure,

wherein the substrate is exposed through the liquid with exposure light [from source LA].

Re claim 20: Lof discloses a device manufacturing method [Fig 1] comprising:
exposing, through a liquid 11, a substrate W held on a holder WT of a stage apparatus [Fig 7a] of an exposure apparatus according to claim 1; and
processing the exposed substrate [Par 0009: other procedures and various processes].

9. Claims 1-12 and 14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukami (WO 99/49504; translated provided by Applicant) in view of Garcia.

Re claims 1, 14, and 15: Fukami discloses an exposure apparatus [Fig 1] comprising:

a projection optical system PL by which an image of a pattern R is projected onto an upper surface of a substrate W; and

a stage apparatus 9.

Fukami does not disclose expressly the stage apparatus including:

a holder having a substrate holding surface on which the substrate is held, there being a gap along an outer circumferential part of the substrate held on the holder;

a lyophilic portion that is disposed in a vicinity of the holder radially outward of the outer circumferential part of the substrate held by the holder, the lyophilic portion being disposed lower than the upper surface of the substrate held by the holder and facing downward; and

a recovery device that recovers a liquid leaked from the gap using the lyophilic portion.

Garcia teaches a stage apparatus [Fig 5i] including:

a holder [C17L19-21: wafer holding device] having a substrate holding surface [edge grip] on which the substrate 108 is held, there being a gap 110a along an outer circumferential part of the substrate held on the holder;

a lyophilic portion 110 [C18L44-45: hydrophilic material] that is disposed in a vicinity of the holder radially outward of the outer circumferential part of the substrate held by the holder [Fig 5i], the lyophilic portion being disposed lower than the upper surface of the substrate held by the holder and facing downward [Fig 5N-2: bottom

Art Unit: 2851

portion of edge platform 110 disposed lower than upper surface of wafer 108 and faces downward]; and

a recovery device 110c that recovers a liquid leaked from the gap using the lyophilic portion 110 [C20L44-46].

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to use the edge platform 110 of Garcia in the immersion lithographic apparatus of Fukami, in order to remove liquid not collected by the liquid recovery device 6, for the purpose of ensuring that all liquid is recovered and to prevent liquid from reaching and damaging the Z stage 9.

Re claims 2-7, 11, 17, and 18: Fukami discloses all limitations of the claimed invention except for the details of the lyophilic portion.

Garcia teaches wherein the recovery device 110c has a suction device 110d that suctions the liquid guided to the lyophilic portion 110 [C20L45: using vacuum];

wherein suction force of the suction device by which the liquid is recovered is greater than suction force by which the substrate is held on the holder [C17L19-21: The holder does not exert suction force since it holds the substrate using an edge grip. Therefore, the suction force of the vacuum source 110d inherently is greater.];

wherein the suction device includes a passage 110e disposed below the lyophilic portion 110, and the lyophilic portion has an inclined portion 110f, which is inclined toward the passage of the suction device 110d [Fig 5N-2];

wherein the lyophilic portion has a first portion 110b that is higher than the substrate holding surface [Fig 5N-2: The edge 110b is higher than the wafer 108;

Art Unit: 2851

therefore, the edge 110b is also higher than the edge grip, which is level to and holds the wafer.];

wherein the recovery device has a recessed portion 110c that suctions the liquid by the capillary phenomenon [recessed portion of 110c inherently suctions liquid by capillary action];

wherein at least a part of the recessed portion 110c is lyophilic [C18L44-45: Edge platform 110, which is the outer part of the multiple inlets 110c, is hydrophilic.];

wherein the lyophilic portion 110 is disposed so that a space 110a is formed between the outer circumferential part of the substrate 108 and the lyophilic portion 110 [Fig 5i];

wherein the lyophilic portion 110 has an inclined surface 110f which is downwardly inclined in a direction away from the substrate 108 held on the holder [Fig 5N-2];

a flat surface 110 which is provided around the holder, and which is substantially flush with the surface of the substrate 108 held on the holder [C17L7-8],

wherein the recovery device 110c recovers, using the lyophilic portion 110, the liquid which has leaked from a gap 110a between the flat surface and the surface of the substrate held on the holder [Fig 5N-2].

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to use the details of the lyophilic portion 110 of Garcia in the immersion apparatus of Fukami, for the purpose of effectively transporting liquid away from the side of the wafer.

Re claims 8-10, 12, and 16: Fukami discloses all limitations of the claimed invention except for a part of the holder being liquid repellent.

Garcia teaches wherein the recovery device 110c has a surface that is substantially parallel to the substrate holding surface [Fig 5N-2: inlets 110c parallel to wafer 108, which is held by and parallel to edge grip to receive adequate support], and at least a part of which is liquid repellent [C18L10-13: Wafer 108, which is part of, or connected to, the edge grip, is hydrophobic, or liquid repellent.];

wherein a portion of the holder [holding 108] which opposes the lyophilic portion 110 is liquid repellent. [Fig 5N-2 and C18L10-13: Wafer 108, which is part of, or connected to, the wafer holding device, is hydrophobic, or liquid repellent.]

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to make a part of the holder of Fukami liquid repellent, as is done in Garcia, for the purpose of effectively dispelling liquid away from the wafer and holder to be removed by the recovery device.

Re claim 19: Fukami discloses a liquid supply system 5 which has a supply port 21a, the liquid supply system supplying a liquid 7 onto the substrate to form a liquid immersion area [at 7] on a portion of a surface of the substrate during the exposure,

wherein the substrate is exposed through the liquid with exposure light IL [Fig 1].

Re claim 20: Fukami discloses a device manufacturing method comprising:
exposing, through a liquid 7, a substrate W held on a holder of a stage apparatus 9 of an exposure apparatus according to claim 1; and
processing the exposed substrate [P26L8-9].

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Liu whose telephone number is 571-272-9019. The examiner can normally be reached on Monday through Friday 9 am - 5 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on 571-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael Liu/
Examiner
Art Unit 2851

ML 11/21/08

/Hung Henry V Nguyen/
Primary Examiner of Art Unit 2851